

# Avocado

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## CROP PROFILE

### SPECIES AND CULTIVARS

- Avocado, *Persea americana* Mill., is a traditional crop of Central America that now grows in most subtropical and tropical countries. There are three distinct races of avocados: Mexican, Guatemalan, and West Indian. Some important commercial cultivars are hybrids of the various races.
- The Mexican race is the most cold tolerant, while the West Indian type is most adapted to warmer climates. Fruits of the Mexican race are generally small with thin, smooth skins, while those of the Guatemalan race have skins that are thick, hard, brittle, and warty. The West Indian type has shiny skin that is thin to medium in thickness.
- 'Hass' is a black-skinned, ovate cultivar whose fruit weighs 5 to 12 oz. It descends primarily from the Guatemalan race. This cultivar accounts for about 75% of the production in California, the main producing U.S. state. 'Hass' is also important in Mexico, the world's largest avocado producer, and in Chile, the main for-

eign supplier to the United States. In Mexico, 'Hass' is harvested all year but the main season is from October to May. In Hawaii, 'Hass' has not produced high quality fruits.

- 'Fuerte', a Mexican and Guatemalan cross, has green-skinned, pear-shaped fruits weighing 6 to 14 oz. It is the main cultivar in South Africa and is the second most widely planted variety in both California (7 to 9% of production) and Chile. 'Bacon', 'Reed', and 'Zutanos' are other green-skinned cultivars produced commercially in California.
- 'Sharwil' is also a Mexican and Guatemalan cross and represents more than 57% of the commercial acreage in Hawaii. Its green-skinned fruits weigh 8 to 20 oz and mature in winter and spring. 'Greengold' and 'Murashige' are other green-skinned cultivars recommended by CTAHR for commercial planting.

### PRODUCTIVITY

- Commercial avocado trees are propagated by grafting or budding scions of desirable cultivars onto seedling or grafted rootstocks. Avocados

Country	Selected Varieties	Approximate Harvesting Season											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mexico-Michoacan	Hass†	_____											
U.S.A.-California	Hass†	_____											
	Fuerte	_____											
	Bacon	_____											
	Zutano	_____											
	Reed	_____											
U.S.A.-Hawaii	Sharwil	_____											
	Greengold	_____											
	Murashige	_____											

† Peak season

can be grown from seeds, but fruit quality and yield potential will be quite variable. Grafted or budded avocado trees usually produce fruits when three to five years old, while seedlings often require five to seven years.

- Avocado can be grown on a wide range of soil types, but requires good drainage as it does not withstand waterlogging. Annual rainfall of 50 inches that is well distributed over the year is adequate. Windbreaks are desirable because avocado wood is brittle.
- Trees are spaced 25 to 35 feet apart in orchards, depending on the cultivar. In Kona, on the Big Island, avocados are often interplanted with coffee and macadamia nuts. But for best management they should not remain interplanted with other fruit crops when mature.
- In California, the average avocado yield is around 5600 lb/ac, while in Michoacan (the major producing state in Mexico) the average is almost 6500 lb/ac. In good orchards, yields may range from 6000 to 12,000 lb/ac in California and 10,000 to 15,000 lb/ac in Mexico. In Hawaii, the 1989 average yield was 4400 lb/ac, but this may increase as newly planted orchards become more productive as they mature.
- Avocados are harvested with hand-held poles and baskets. In flat areas in California, man-positioning machines are used to lift the pickers. Determining when to harvest avocados can be difficult and may require experience. A slight change in skin color, loss of glossiness, or a brown seed coat is a sign of maturity.

### USES AND PRODUCTS

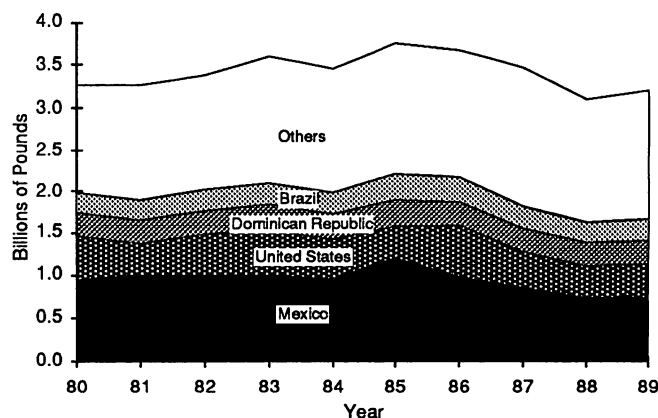
- Unlike many fruits that typically have a sweet or acidic taste, avocados have a smooth, buttery consistency and a rich flavor. A popular use is as a salad fruit. Avocados are also processed into guacamole and can be used in sandwich spreads. Avocado paste with flavor extracts and skim milk can also make an ice cream.
- Avocados have 1.6 times as much potassium as bananas. A 3.5-oz serving has about 177 calories, contains no cholesterol, and has about 0.6 oz of fat, which is primarily the monosaturated type. Nutrient values vary by cultivar.
- Oil extracted from avocados can be used for cooking and preparation of salads, sauces, and

marinades. Avocado oil also can be used for skin care products such as sunscreen lotions, cleansing creams, and moisturizers, or for hair conditioners and makeup bases.

- Avocados are often eaten with soy sauce or grated horseradish in Japan. In Europe, avocados are generally served as an appetizer with mayonnaise or salad dressing, or are filled with a seafood cocktail.

### WORLD SUPPLY AND DEMAND

- According to FAO estimates, world avocado production amounted to 3.2 billion lb in 1989. Mexico was the leading producer, accounting for 23% of the total production. Other major producers include the United States, the Dominican Republic, Brazil, Indonesia, and Israel.
- Avocado consumption is concentrated in the major producing areas. For example, Mexico, the United States, the Dominican Republic, and Brazil consume most of their production.
- Israel has traditionally been the world's largest avocado exporter. In 1986, Israel exported more than 133 million lb of avocado to the EC (European Community) market, but severe weather recently reduced the crop size. South Africa, the United States, Chile, Mexico, Spain, Kenya, and a number of smaller countries including Martinique also export avocados.
- Mexican exports of avocados have increased considerably in the late 1980s. In 1980, Mexico exported only 1.1 million lb of avocado compared to 33.2 million lb in 1988.

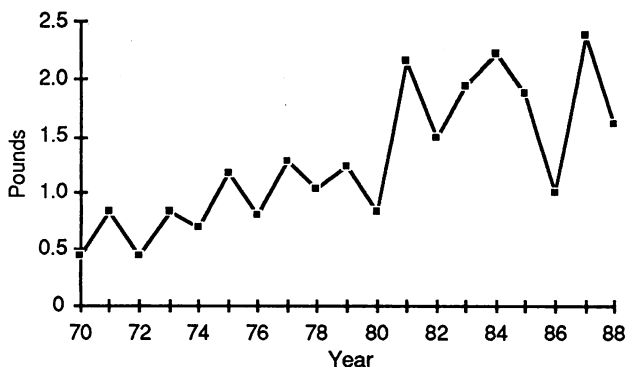


World avocado production, 1980-89

- The EC imports considerable quantities of avocados, with France and the United Kingdom being the major markets. Canada and Asian countries also import avocados, but to a lesser degree than the EC.

## THE UNITED STATES MARKET

- In 1989–90, California produced 208 million lb of avocados, a 37% decline from the previous year. Freeze damage was a major reason for the drop in production. Other U.S. producers include Florida (67 million lb) and Hawaii (1.1 million lb).
- U.S. per capita consumption of fresh avocados increased from 0.4 lb in 1970 to 1.5–2.2 lb in the late 1980s. This is equivalent to nectarines and comparable to pineapples (1.7 lb), but considerably lower than bananas (24.2 lb), apples (19.1 lb), and oranges (14.5 lb). Avocado consumption is also concentrated in the West and Southwest regions (about 75%).
- ‘Hass’, with black skin when ripe, is the most widely consumed avocado cultivar on the U.S. mainland. Avocado consumption declines during fall and winter when there are less-desirable cultivars in the market. According to the California Avocado Commission, California growers received the highest price for ‘Hass’ (average of 40¢/lb from 1980–89) when compared to Fuerte (23¢/lb) and other cultivars that have green skin when ripe (17¢/lb).
- Many consumers have trouble identifying ripe ready-to-eat avocados, especially green-skinned cultivars. Stickers are now placed on ethylene gas-ripened avocados in retail outlets to help consumers select ripe fruits.



U.S. per capita consumption of avocado, 1970–88

- In 1990, the United States imported 29.4 million lb of avocados at a CIF (cost, insurance, and freight) value of \$24.3 million. Chile was by far the major supplier, accounting for 95.2% of the quantity imported, followed by the Dominican Republic (4.4%). About 80% of the avocados were imported from September to December. Currently, fresh whole avocados from Mexico are not permitted to enter the United States due to quarantine restrictions related to fruit fly and seed weevil.
- A number of avocado shippers are listed by state in various issues of *The Packer*, published by Vance Publishing Corporation.
- In 1990, the United States exported 10.9 million lb of avocados at an FAS (free alongside ship) value of \$7.8 million. Canada received about 71% of the quantity exported. Other destinations included Japan, the United Kingdom, and the Federal Republic of Germany.

## OTHER MARKETS

### ASIA

- Japan imported 5.9 million lb of fresh avocados in 1989 at a CIF value of \$6.5 million. The United States and Mexico supplied 62.5% and 37.5% of the total quantity imported, respectively.
- In Japan, avocados from California are generally received from February to October, while Mexico fills the void during the rest of the year.
- In 1989, Hong Kong imported 2.5 million lb of fresh avocados at a reported value of HK\$12.2 million. The major suppliers were Thailand (36.5% of the quantity imported), Malaysia (19.5%), China (17.6%), Australia (12.5%), and the United States (9.3%).

### WESTERN EUROPE

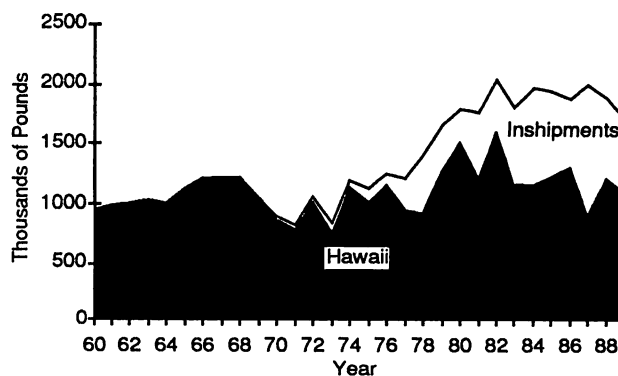
- The EC is a major import market for avocados. In 1989, EC countries imported 208.7 million lb of fresh avocados at a CIF value of \$155.1 million.
- France is by far the leading importer of avocados in the EC. In 1989, France accounted for 66.2% of the EC imports, followed by the United Kingdom (15.2%), the Federal Republic of Germany (7.0%), and the Netherlands (5.2%).

- In 1989, the major suppliers of avocados to the EC were South Africa (33.6% of the total quantity imported), Israel (24.2%), Spain (10.3%), and Mexico (9.8%).
- The major avocado suppliers to France in 1989 were South Africa (35.6% of the quantity imported), Israel (29.4%), Spain (13.7%), and Mexico (9.9%). South Africa usually supplies the market from April to September, Israel from October to April/May, and Spain from November to April.
- Most consumers in Europe prefer pear-shaped bright green avocados such as 'Fuerte'. 'Hass' has been unpopular due to its dark, warty skin, but has become increasingly more accepted. Cultivars with large or loose seeds are undesirable.
- In 1989, the average CIF price of fresh avocado imported to France, the United Kingdom, and the Federal Republic of Germany was 75¢/lb, 72¢/lb, and 76¢/lb, respectively.

## AVOCADO IN HAWAII

- In 1990, there were 120 Hawaii farms planting a total of 500 acres of avocados, of which 250 acres were bearing. Most of the state's avocados are grown in the Kona district of the Big Island with some production in Kula, Maui. 'Sharwil' avocados (325 acres) accounted for most of the planted acreage, with the remainder in other cultivars, including 'Kahaluu', 'Nishikawa', 'Yamagata', 'Ohata', 'Hass', and 'Linda'.
- Industry analysis identified the lack of high quality, high yielding, summer-bearing cultivars. Several low quality cultivars are available, however.
- In 1990, the total farmgate value of avocados in Hawaii was \$405,000. The average 1990 farmgate price was 45¢/lb, an 84% increase from 1985. The price increase is due partly to the increase in production of 'Sharwil' avocados, which receive higher prices than other varieties. Retail prices for 'Sharwil' ranged as high as \$1.69/lb in spring 1988 in major Honolulu markets, while other Hawaii-grown cultivars were priced up to \$1.19/lb.

- 'Sharwil' avocados have small seeds and greenish-yellow flesh with a rich, nutty flavor. In Hawaii, many consider 'Sharwil' to be superior to California cultivars and believe it should be marketed as a gourmet item. 'Sharwil' has green skin when ripe, however, which is a problem where consumers rely on black skin as a sign of ripeness.
- Hawaii's avocado industry provides the majority of the state's avocado market supply. In 1990, 900,000 lb of avocados were harvested in Hawaii, while 529,000 lb were inshipped. The local avocado supply is even larger when home production is considered.
- 'Sharwil' is the only Hawaii avocado authorized for shipment to Alaska and the U.S. mainland in compliance with USDA/Animal and Plant Health Inspection Service (APHIS) requirements. Avocados destined for these markets are required to be packed in a fruit fly-proof, APHIS-approved and -inspected packinghouse.
- Canada is not concerned with fruit flies and accepts Hawaii avocados. In 1990, Hawaii exported 19,500 lb of avocados directly to Canada at an FAS value of \$22,900. California and Mexico are the major suppliers to Canada's market.
- The Hawaii Avocado Association was formed in the early 1980s and represents growers, packers, and distributors of avocados in Hawaii. The association has been active in promoting Hawaii avocados and produces a membership newsletter.



Hawaii avocado market supply, 1960-89

Reference to a company or product name does not imply approval or recommendation of the product by the College of Tropical Agriculture and Human Resources, University of Hawaii. Research for this publication was funded by the Agricultural Diversification project, administered by the USDA.

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A list of references is available from the authors upon request.